Technical Workshop #4 – Aliso OII I.17-02-002
Sensitivity Results, 1 in 35 Hydraulic Modeling and Feasibility Study results

Energy Resource Modeling Team

Energy Division, CPUC
WebEx only

October 15, 2020

TODAY'S AGENDA

9:30 – 9:45 Introduction. Ground Rules, Review Purpose and Goals

Commissioner Liane Randolph

Donald Brooks, Program and Project Supervisor

9:45 – 10:00 Review of Phase II Schedule and Order of Modeling Steps

Donald Brooks, Program and Project Supervisor

10:00 – 10:45 Sensitivities on Winter 2030 1-in-10 Hydraulic Modeling

Lisa Cosby, Regulatory Analyst

- 30 min presentation / 15 min Q/A

10:45 – 11:00 Break

11:00 – 12:00 1-in-35 Extreme Peak Demand with Minimum Local Generation

Khaled Abdelaziz, Ph.D., Utilities Engineer

- 30 min presentation / 30 min Q/A

12:00 – 1:00 Lunch Break

1:00 – 2:30 Feasibility Study Results and Storage Inventory

Khaled Abdelaziz, Ph.D., Utilities Engineer

Christina Ly Tan, Regulatory Analyst

- 60 min presentation / 30 min Q/A

2:30 – 3:15 Q&A

3:15 – 3:30 Wrap Up/Next Steps

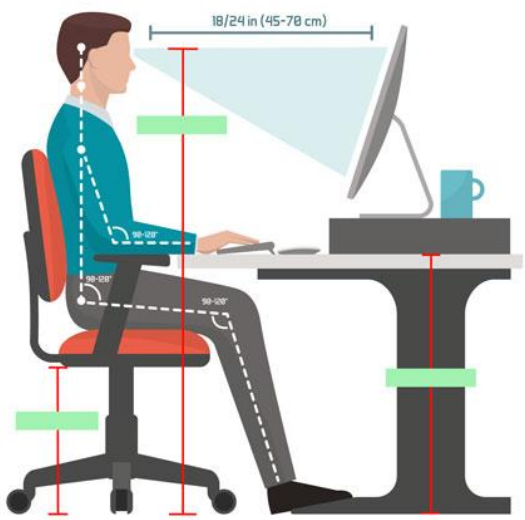
Workshop Logistics

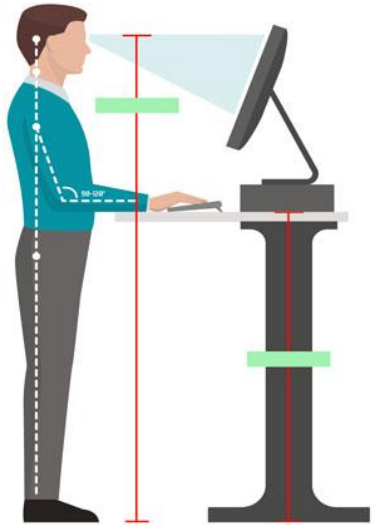
- Online only

Join through this link:
https://cpuc.webex.com/cpuc/onstage/g.php?MTID=eac613d8f3522678bba35bbb54f75b1e3

Audio through computer or phone
  - Toll-free 1-855-282-6330
  - Access code: 146 385 8849
  - ***This workshop is being recorded***
- Hosts:
  - Commissioner Randolph
  - Energy Division Staff:
    - Christina Ly Tan
    - Donald Brooks

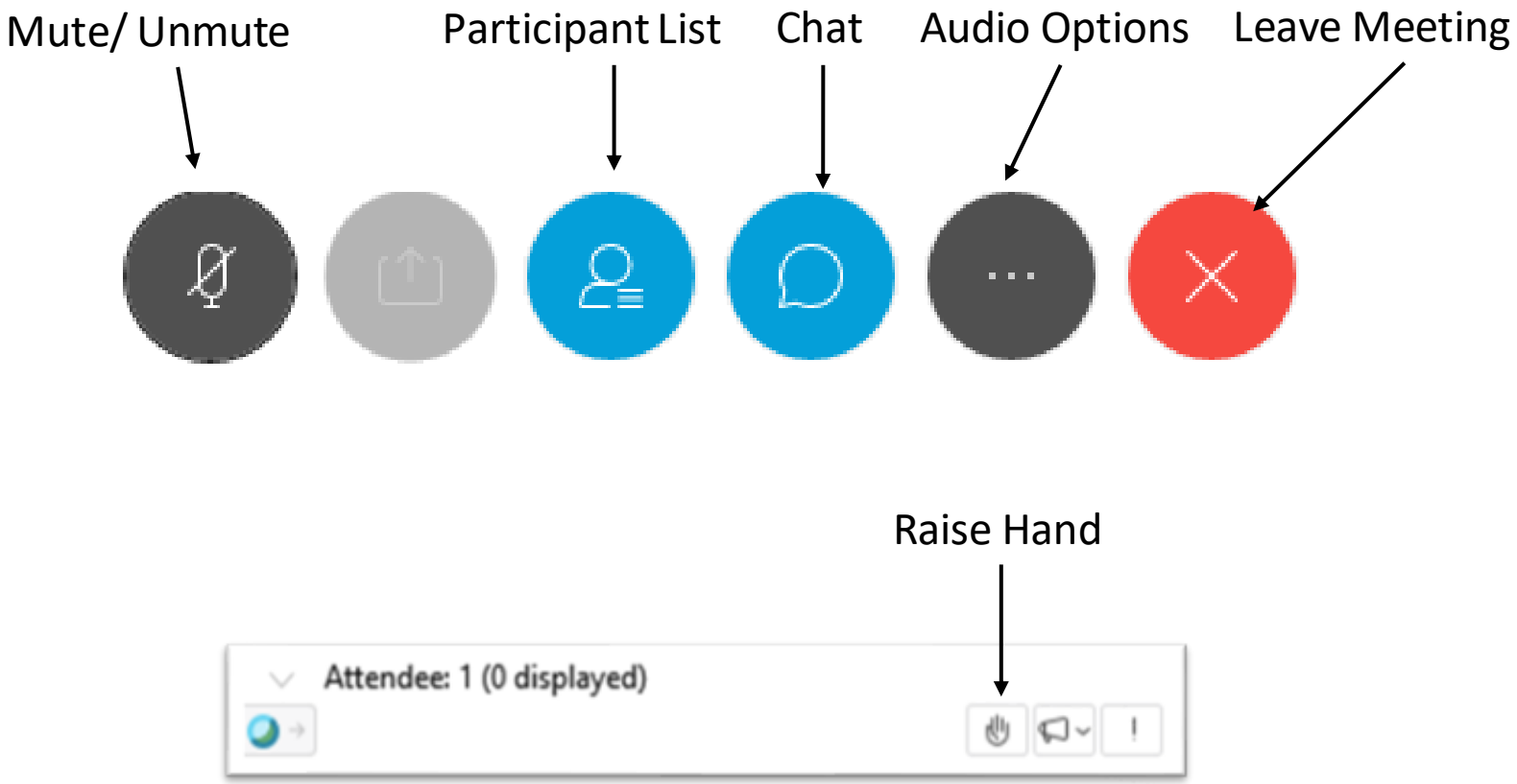
- Safety
  - Note surroundings and emergency exits
  - Ergonomic Check





Workshop Logistics

- Today's presentations (.pdf) and agenda are available on https://www.cpuc.ca.gov/AlisoOII.
- Please submit questions for speakers in the Chat box or raise your hand to be unmuted by staff
- Questions will be read aloud by staff (Reminder: Mute back!)



Discussion Logistics

- Workshop is structured to stimulate an honest dialogue and engage different perspectives
- Keep comments friendly and respectful
- Chat feature is only for Q&A or technical issues. Do not start or respond to sidebar conversations
  - This will be held via WebEx Events, where everyone is muted at the beginning of the webinar.
  - Speakers are asked to state their name and their organization before speaking.
  - To speak during the Q/A times, please send your questions to the moderator via the Chat feature or via email: AlisoCanyonOII@cpuc.ca.gov

Workshop Scope

- In Scope:
  - Phase 2 issues of the Aliso OII I.17-02-002, including staff analysis and recommendations for the new maximum Aliso Canyon storage capacity.
- Out of Scope:
  - Proposed decision (forthcoming) on the interim storage level at Aliso Canyon, to be issued ahead of the Jan. 1, 2021 statutory deadline
  - Phase 3 issues

Workshop Objectives

- Information sharing:
  - Review overall objectives and analysis required for I.17-02-002.
  - Present Sensitivity Results based on Winter 2030.
  - Present Results of 1 in 35 extreme peak Hydraulic Modeling.
  - Present Feasibility Results.
- Solicit feedback, answer questions from parties, and promote open, informal discussion.

Review of Objectives - Phases of Proceeding

- The CPUC opened I.17-02-002 pursuant to SB 380 to "determine the feasibility of minimizing or eliminating the use of the Aliso Canyon Natural Gas Storage Facility while maintaining energy and electric system reliability."
- CPUC staff have engaged in an extensive stakeholder process to evaluate the effects of minimizing or eliminating Aliso.
- The CPUC published a Final Scenarios Framework on Jan 4, 2019, which described the overall sequence and process of studies in Phase 1 of the proceeding.

Review of Objectives - Phases of Proceeding

- The Scenarios Framework sought to answer the following questions:
  - Is the Aliso Canyon storage field needed for reliability?
  - If so, what is the minimum inventory level required?
  - What are the cost and affordability impacts to gas and electric customers if the Aliso storage field is closed or operated at reduced inventory?
- This Phase 2 workshop presents results of studies designed to identify the gaps or the needs that could result if Aliso Canyon is minimized or eliminated given the gas infrastructure currently in place and current statutes, rules, and regulations.
- Once we identify these gaps…
  - A new maximum Aliso Canyon storage capacity will be determined.
  - We can begin to discuss what changes could be made to gas infrastructure, rules and regulations to eliminate the need for Aliso Canyon in Phase 3.

Review of Phase II Schedule and Order of Modeling Steps

EVENT	DATE
Workshop 3 (Peak (1-in-10) Hydraulic Results)	July 28, 2020
Ruling Issuing Economic Analysis Report	August 2020
Opening and Reply Comments on the Economic Analysis Report	August – September 2020
Workshop 4 (Extreme Peak (1-in-35) Hydraulic Results)	September 2020
Ruling Issuing Production Cost Modeling and Hydraulic Modeling Report	Q4 2020
Opening and Reply Comments on the Production Cost Modeling and Hydraulic Modeling Report	Q4 2020
Proposed Decision Adopting Modeling Reports	Q4 2020 or Q1 2021

Technical Workshop #4
Aliso Order Instituting Investigation - 17-02-002
Simulation 05 Winter 2030 Sensitivities

Lisa Cosby

Energy Resource Modeling

October 15, 2020

California Public
Utilities Commission

Outline of Presentation

Simulation #05 and Sensitivities

1) Review of 1-in-10 Hydraulic Modeling Case: Simulation 05 Winter 2030
2) Simulation 05 Inputs
3) Simulation 05 Sensitivities
4) Conclusions
5) Questions and Answers

Objectives of Presentation

1) Review SoCalGas's (SCG's) Simulation 05 (Winter 2030).
   A. Presented at July 28, 2020 workshop
   B. The only simulation that allowed Aliso Canyon withdrawals
   C. Used 90% Non-Aliso Inventories
   D. Determined Aliso withdrawal rate at these Non-Aliso inventory levels

2) Present Staff's Sensitivities on Simulation 05:
   A. Use Non-Aliso inventory levels of 37%, 50%, and 70%.
   B. Determine Aliso withdrawal rate and inventory level at these Non-Aliso inventory levels.

Review of 1-in-10 Hydraulic Modeling Cases

Simulations 01 – 06 Presented at July 28, 2020 Workshop

Sim-ulation	Study Year	Season	Weather Conditions	Aliso Canyon Withdrawal Rate (MMcfd)	Simulation Failure or Success	Success or Failure Reason, or Exception
1	2020	Winter	1-in-10 Reliability Standard	0	Failure	Linepack not recovered
2	2020	Summer	1-in-10 Summer Peak Day	0	Success	Potential negative impact on elec gen costs (a)
3	2025	Winter	1-in-10 Reliability Standard	0	Failure	Linepack not recovered
4	2025	Summer	1-in-10 Summer Peak Day	0	Success	Potential negative impact on elec gen costs (a)
5	**2030**	**Winter**	**1-in-10 Reliability Standard**	**520**	**Success**	Small minimum operating pressure violations in San Joaquin Valley
6	2030	Summer	1-in-10 Summer Peak Day	0	Failure	Linepack not recovered

(a) Addressed in Economic Analysis presented at June 2019 workshop

Source of first four columns: I.17-02-002 Phase 2: Further Hydraulic Modeling Explanation and Updates, posted May 27, 2020
Source of Failure or Success column: Los Alamos National Laboratory presentation from7/28/2020 workshop, p. 14

Simulation 05 Description

Simulation 05 is a scenario based on:

1) Supply
2) Pipeline infrastructure
3) Demand
4) Storage capabilities

Designed to test the level of Aliso Canyon withdrawal that would be required on a 1-in-10 winter day based on Winter 2030. This does not analyze multiple cold days or a cold year. The feasibility study presented later addresses multiple cold days.

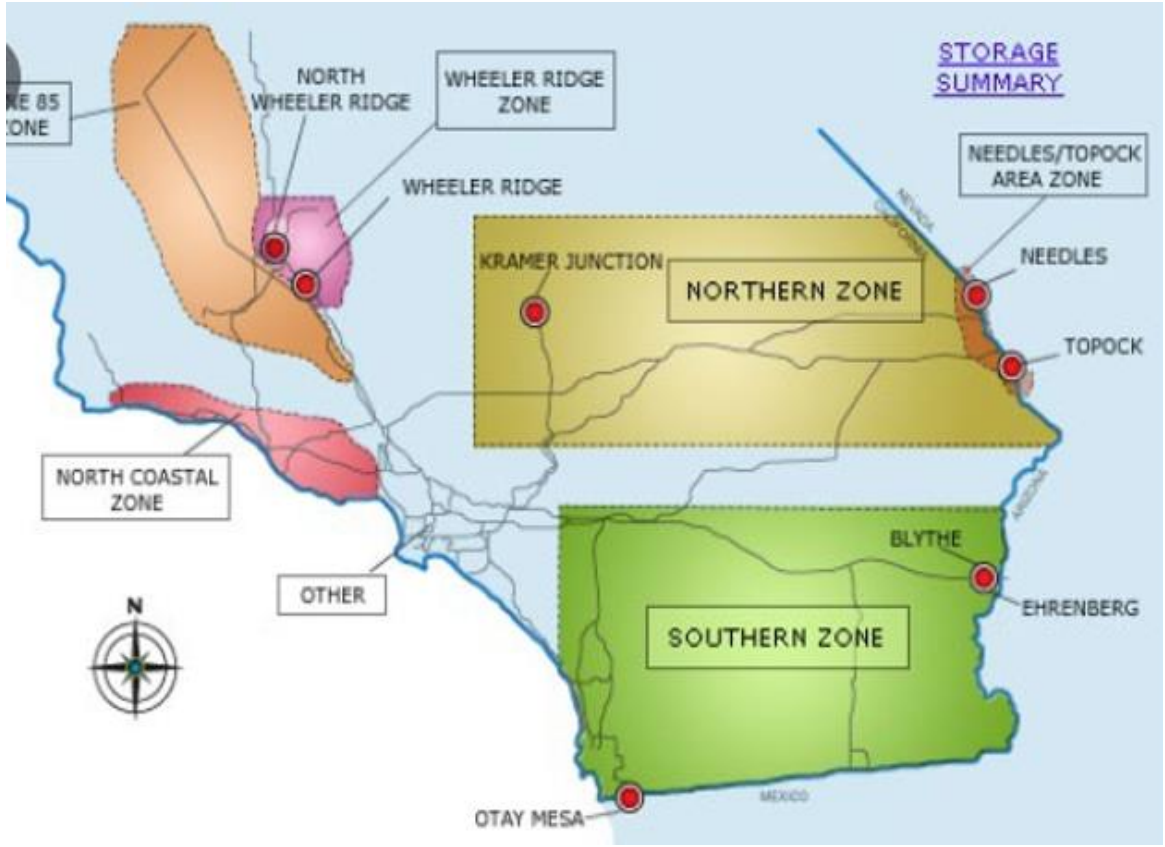
Allows Aliso withdrawal.

Based on Scenarios Framework for Investigation 17-02-002 and May 27, 2020 Hydraulic Modeling Clarifications [(a)].

(a) https://www.cpuc.ca.gov/AlisoOII/

Pipeline Supplies - Simulation 05

Pipeline Supply	MMcfd
North Needles	430
South Needles (Topock)	400
Kramer Junction	420
Wheeler Ridge	765
Blythe Ehrenberg	980
Otay Mesa	50
CA Producers	70
Total	3,115

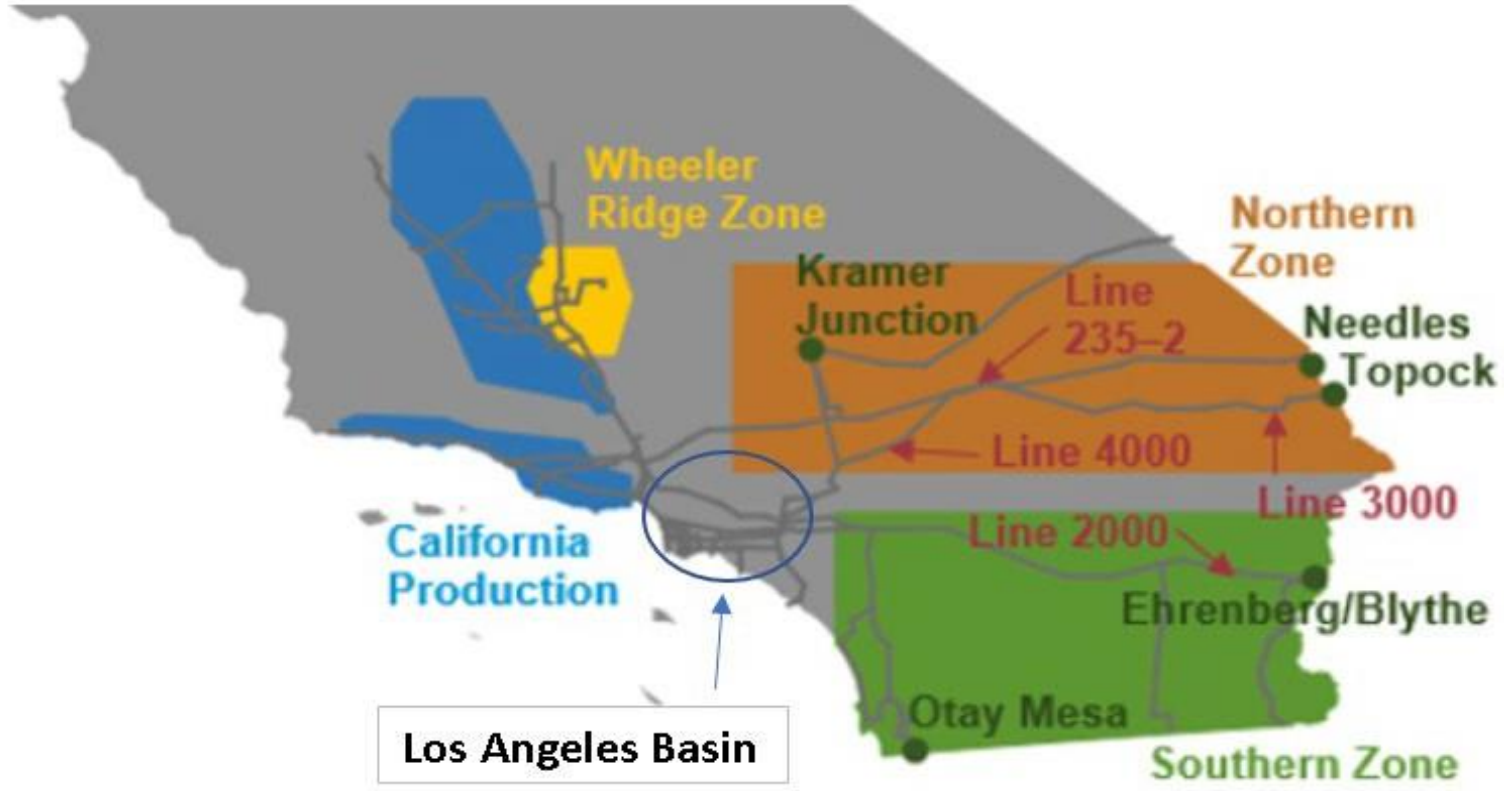


85% Pipeline Utilization in Northern and Southern Zones and 100% in Wheeler Ridge Zone

Source of MMcfd: Checklist provided by CPUC to So Cal Gas in Data Request

Source of Map: Sempra SoCalGas ENVOY

Pipeline Infrastructure



eia Source: U.S. Energy Information Administration

Demand – Winter 2030

Customer Class	Demand (MMcfd)	Source
Core	3,034	Los Alamos National Lab (LANL) 7/28 presentation p.10
Non-Elec Gen Non-Core	664.6	LANL 7/28 presentation p. 10
Elec Gen	1,122.6	CPUC Production Cost Modeling (unconstrained scenario) (a)
Total	4,821.2	
Pipeline Supply	3,115.0	earlier page
Difference	1,706.2	customer demand in excess of pipeline supply; storage withdrawals needed

(a) The CPUC-created Electric Generation (EG) profiles from production cost modeling are based on the economically optimal production of electricity. This was presented in the July 28, 2020 workshop.

Storage Capabilities
of Natural Gas Fields
Used in Original Simulation 5 (Base Case)

Natural Gas Field	Maximum withdrawal rate (MMcfd) 90% Inventory	Simulation 05 Results from So Cal Gas Withdrawal Rate (MMcfd)
Aliso Canyon	1,265	520
Honor Rancho	802	802
La Goleta	228	228
Playa Del Rey	299	299
Total	2,594	1,849

Storage Field Map

Southern California Gas Company (SoCalGas)

Simulation 5 Key Results

Conducted by So Cal Gas
Presented at July 28, 2020 Workshop

To meet the forecast Winter 2030 coldest day in 10 years:

- **Demand would be met by using pipeline supply of 3,115 and storage withdrawals of 1,849 MMcfd**

- **With inventory levels of 90% at the Non-Aliso storage fields, required withdrawal rate from Aliso Canyon would be 520 MMcfd.**

Simulation 5 Sensitivities

CPUC ran the Synergi Model for Simulation 5 with three Non-Aliso inventory levels:

37%

50%

70%

Inventory levels decrease throughout the winter, as gas is withdrawn to meet demand.

By the end of winter, Non-Aliso natural gas storage fields inventory levels have averaged 67% in February from 2017-2020.

The Non-Aliso fields inventory was 37% in late February 2019.

Pause for Questions

Simulation 5 Sensitivities

Preview of Results

Sensitivity	Non-Aliso Inventory	Aliso Canyon Maximum Withdrawal Rate (MMcfd)	Aliso Canyon Inventory Bcf
1	70%	830	13
2	50%	1,010	20
3	37%	1,160	27
Current Authorized Max			34

Simulation 5 Sensitivity Inputs

Input	Base Case	Sensitivity 1	Sensitivity 2	Sensitivity 3
Pipeline Supply	3,115 MMcfd	Same as base case	Same as base case (a)	Same as base case (a)
Pipeline Infrastructure	Slide 16 above	Same as base case	Same as base case	Same as base case
Customer Demand	4,821.2 MMcfd	Same as base case	Same as base case	Same as base case
Storage Capabilities: Non-Aliso Inventory	90%	70%	50%	37%

(a)With small adjustments based on Synergi steady state

Criteria for Simulation Success

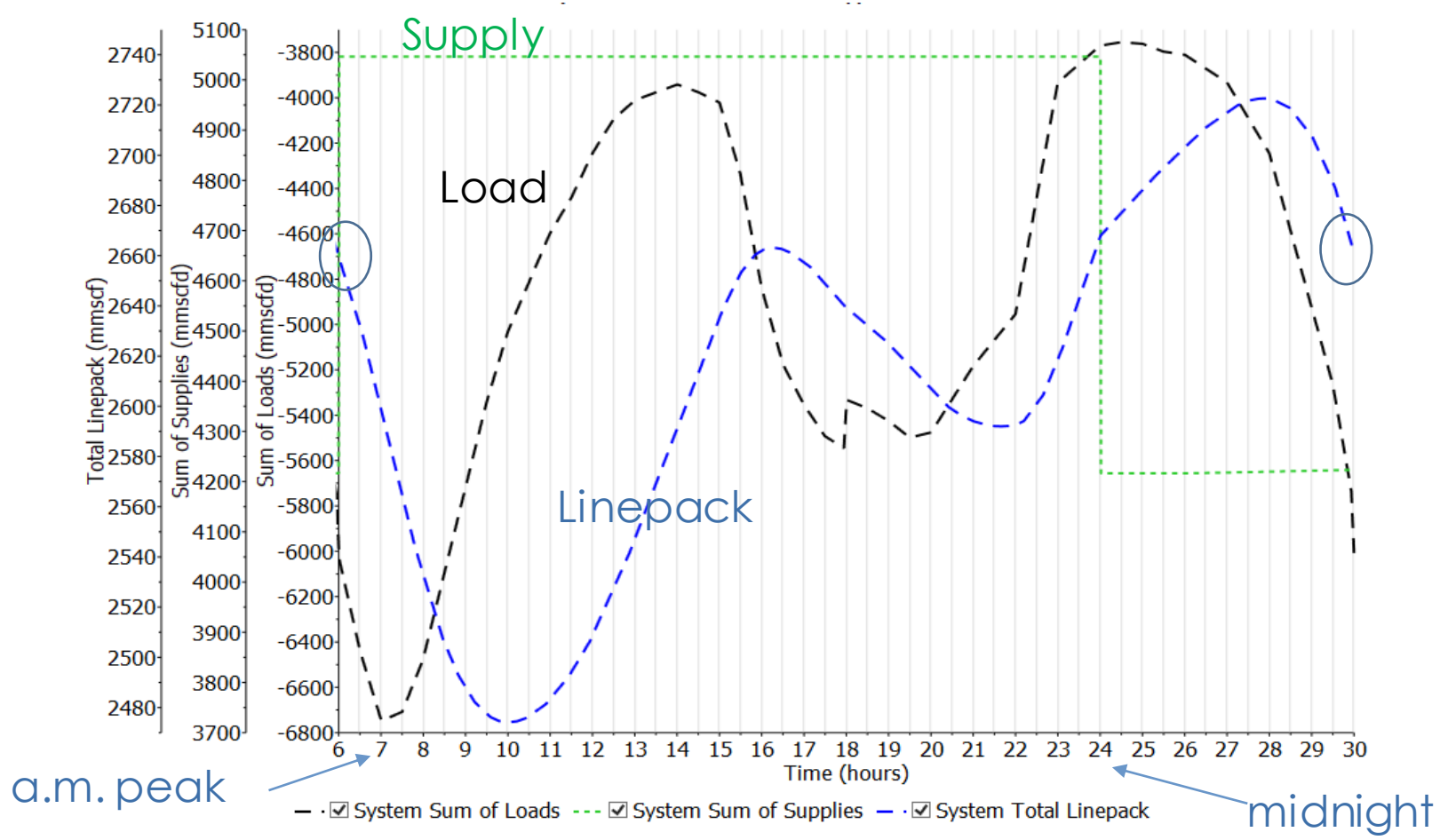
1	Pressures remained above Minimum Operating Pressures (MinOP)?
2	Customer demand was met and regulators operated within rated capacities?
3	Pressures remained below Maximum Operating Pressures (MOP)?
4	Linepack was recovered? (a)
5	Storage fields maintained pressure?

(a) Linepack is the gas present in the pipelines throughout the pipeline system. Linepack being restored means that the amount of gas present in the pipeline at the end of the simulation is approximately equal to the amount of gas at the beginning of the simulation which guarantees each operating day does not impose any constraints on future days.

Source of criteria: Scenarios Framework Final Version Adopted January 4, 2019, pp. 24- 25, cpuc.ca.gov/AlisoOII/

Sensitivity 1 – Non-Aliso Inventory 70%

Loads, Supplies, Linepack- 830 MMcfd Needed from Aliso



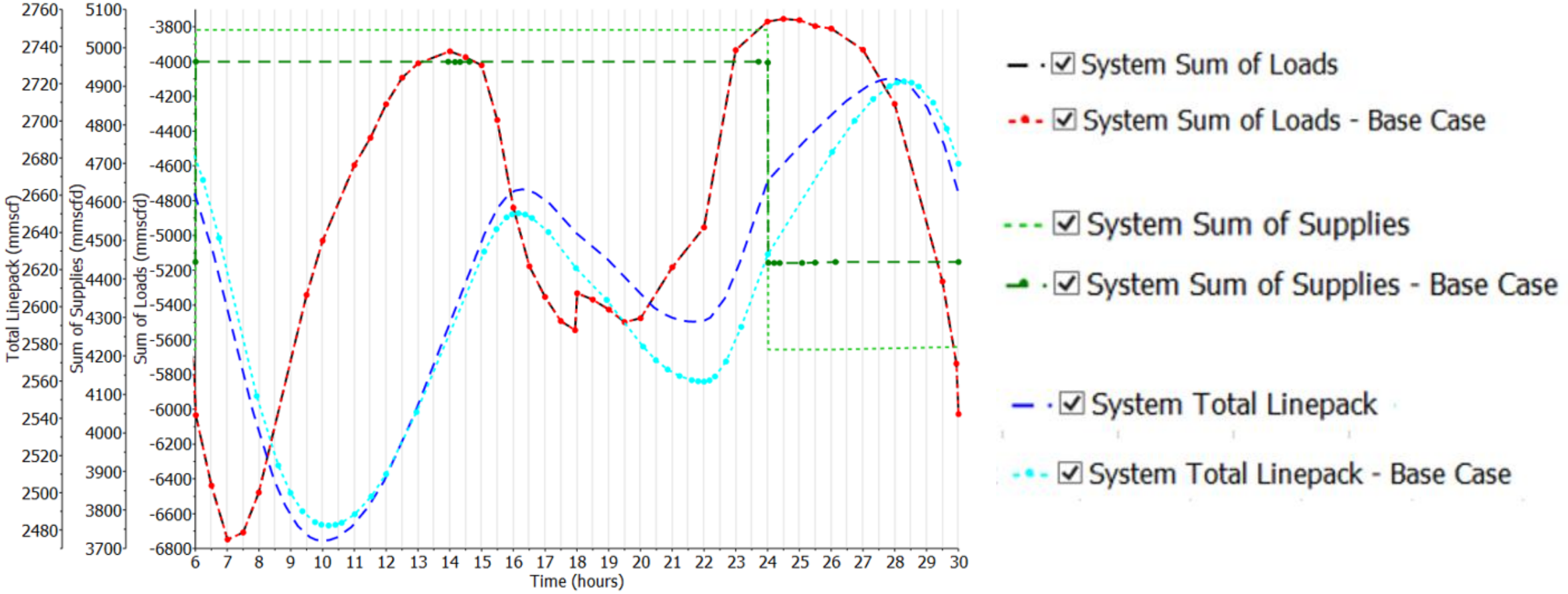
Linepack at time 6 approximately equals level at time 30: 2,660 million standard cubic feet

Supply is from pipelines and storage withdrawals

X axis shows 24 hours from 6 am through 6 am the next day, represented by hour 30.
Loads are Customer Demand in negative numbers. Peak at 7 am, small peak at 18:00.

Sensitivity 1 – Non-Aliso Inventory 70%

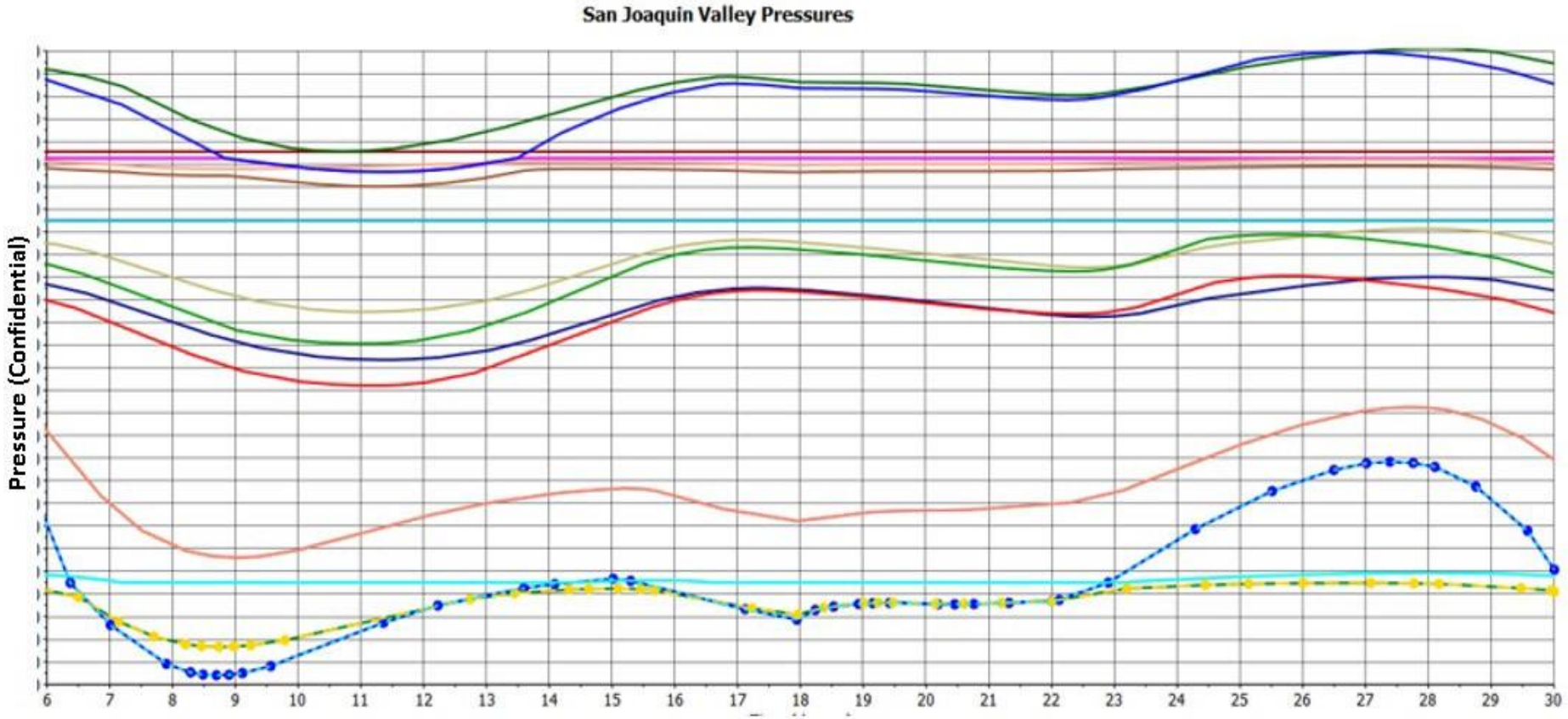
Loads, Supplies, Linepack - Overlayed with Base Case



Sensitivity 1 – Non-Aliso Inventory 70%

Minimum Operating Pressure Results

Non-Aliso Inventory 70% Full, Aliso WD Rate 830



Lines represent nodes (confidential). Low pressures between hour 8 and 9.

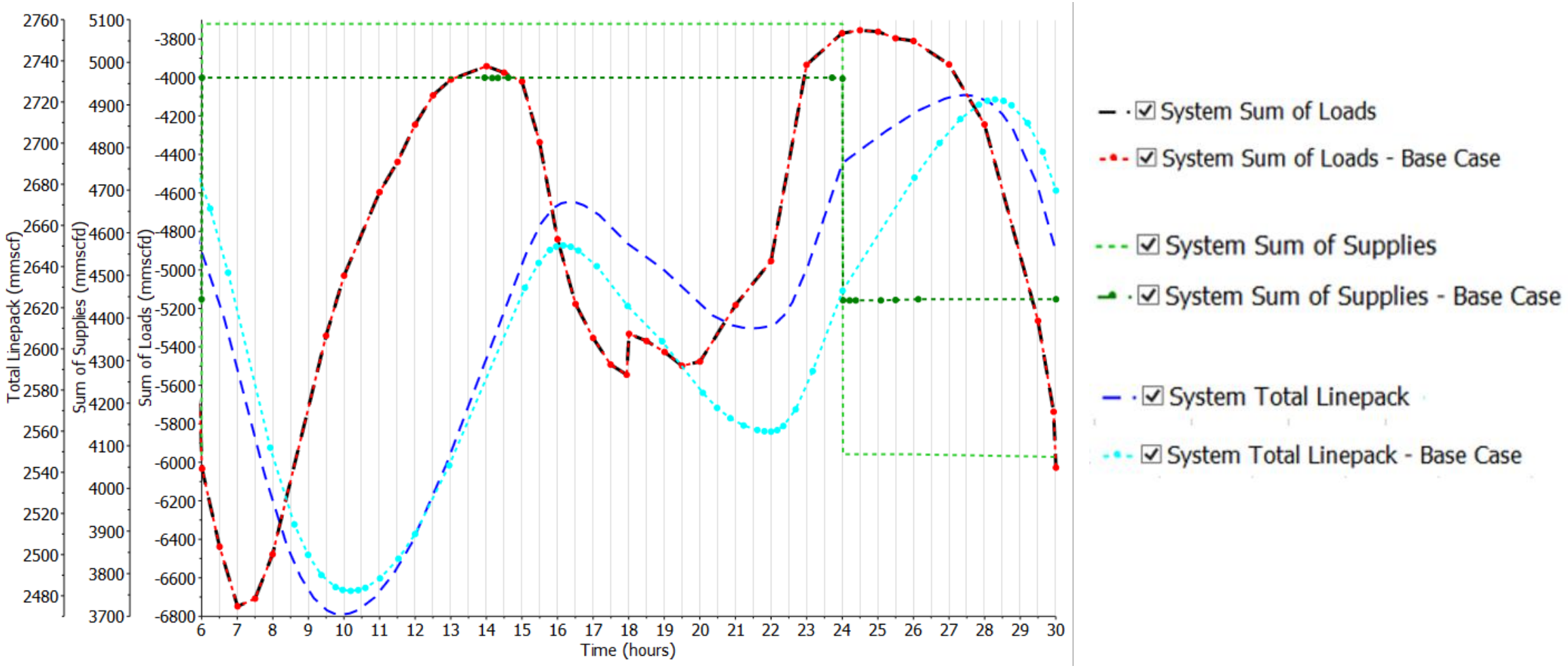
Sensitivity 1 – Non-Aliso Inventory 70%

Criteria for Success or Failure

	Criteria for success of simulation	Criteria Met	Notes
1	Pressures above Minimum Operating Pressures (MinOP)?	Yes	9 exceptions in San Joaquin Valley, all returned from violations during simulation
2	Demand was met and regulators operated within rated capacities?	Yes	Supply 5,061 Bcf exceeded Demand 4,821 Bcf
3	Pressures below Maximum Operating Pressures (MOP)?	Yes	Two nodes exceeded max pressures by minor amounts; one did not return from minor violation
4	Linepack recovered?	Yes	Time 6: 2,658 Time 30: 2,661
5	Storage fields maintain pressure?	Yes	Pressures at time 30 are within 1% of pressures at time 6

Sensitivity 2 – Non-Aliso Inventory 50%

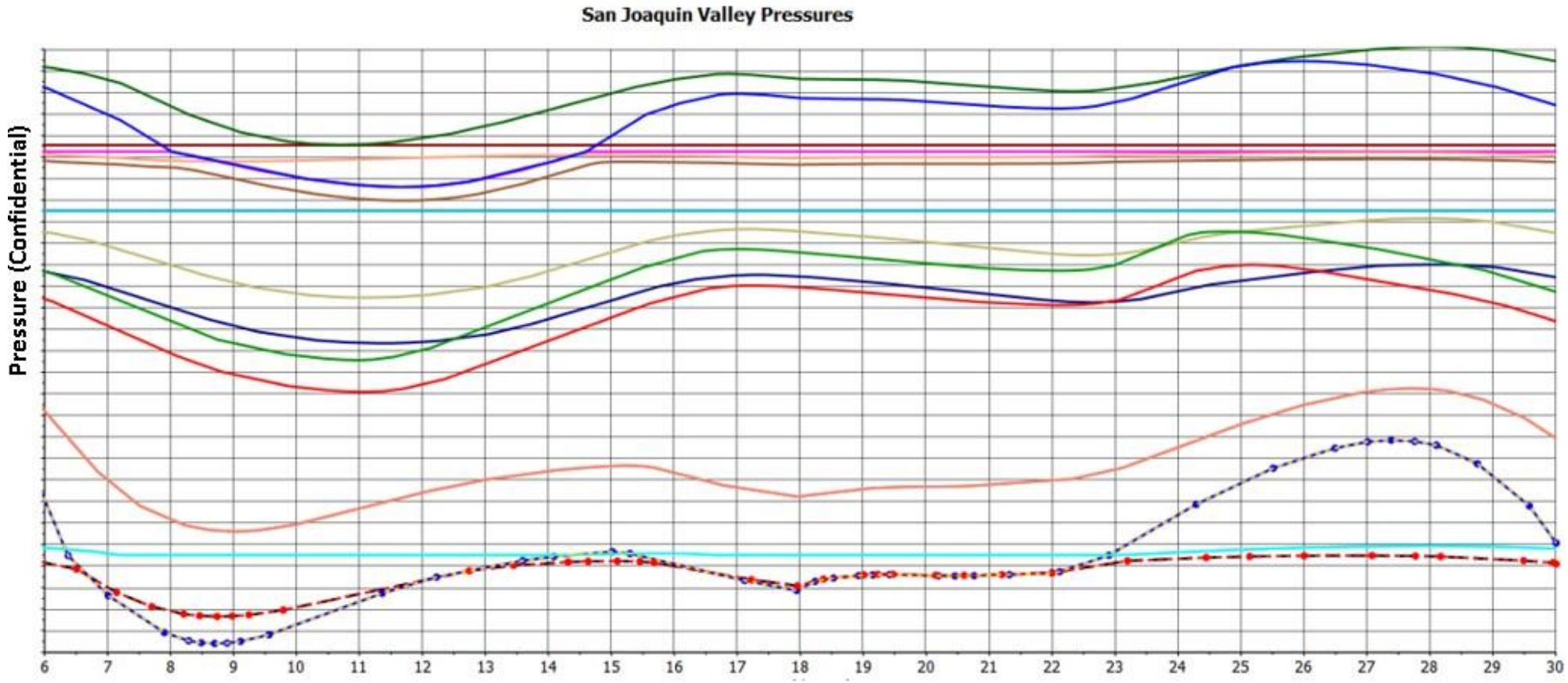
Loads, Supplies, Linepack - 1,010 MMcfd Needed from Aliso



Sensitivity 2 – Non-Aliso Inventory 50%

Minimum Operating Pressure Results

Non-Aliso Inventory 50% Full, Aliso WD Rate 1,010



Lines represent nodes (confidential). Low pressures between hour 8 and 9.

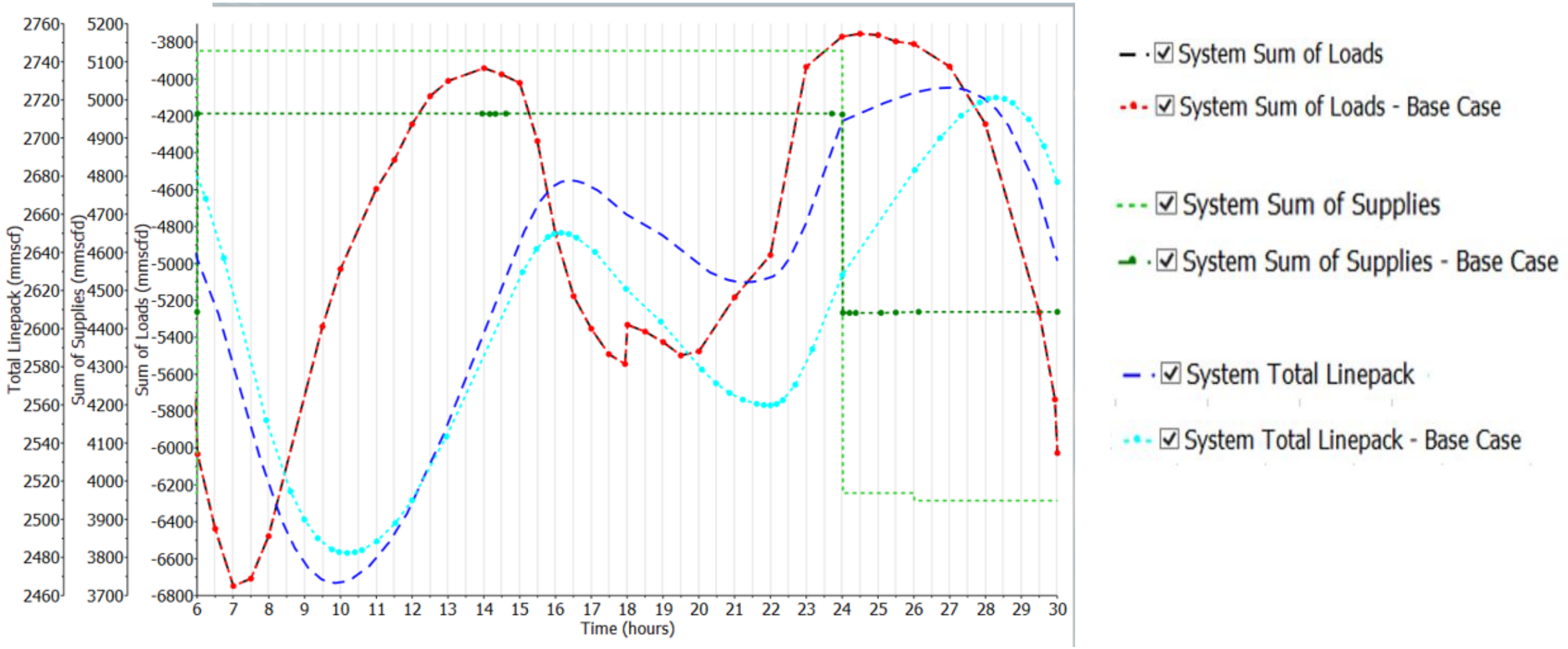
Sensitivity 2 – Non-Aliso Inventory 50%

Criteria for Success or Failure

	Criteria for success of simulation	Criteria Met	Notes
1	Pressures above Minimum Operating Pressures (MinOP)?	Yes	9 exceptions in San Joaquin Valley, all returned from violations during simulation
2	Customer demand was met and regulators operated within rated capacities?	Yes	Supply 5,041 Bcf exceeded Demand 4,821 Bcf
3	Pressures below Maximum Operating Pressures (MOP)?	Yes	Two nodes exceeded max pressures by minor amounts; one did not return from minor violation
4	Linepack recovered?	Yes	Time 6: 2,647, Time 30: 2,647
5	Storage fields maintain pressure?	Yes	Pressures at time 30 are within 1% of pressures at time 6

Sensitivity 3 – Non-Aliso Inventory 37%

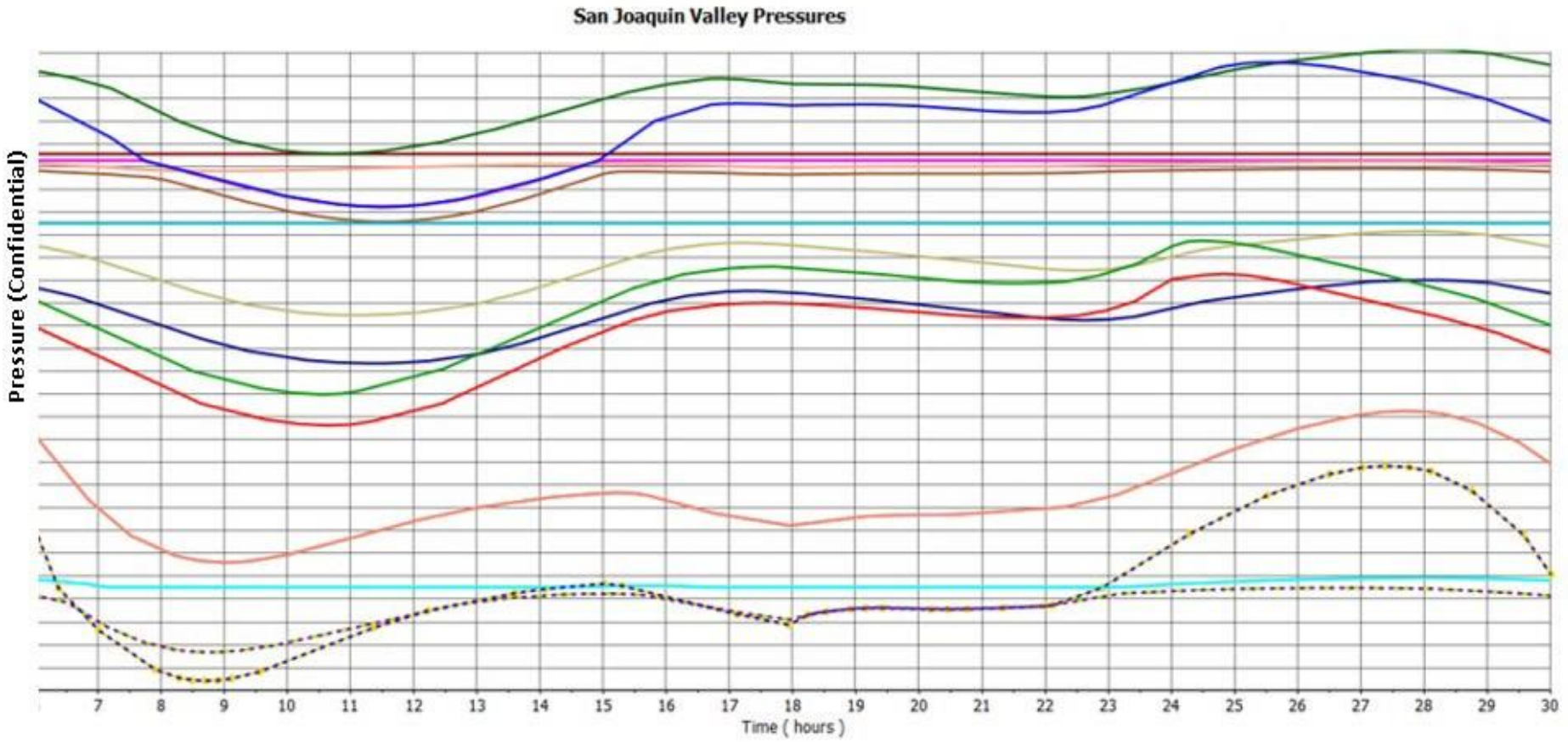
Loads, Supplies, Linepack - 1,160 MMcfd Needed from Aliso



Sensitivity 3 – Non-Aliso Inventory 37%

Minimum Operating Pressure Results

Non-Aliso Inventory 37% Full, Aliso WD Rate 1,160



Lines represent nodes (confidential). Low pressures between hour 8 and 9.

Sensitivity 3 – Non-Aliso Inventory 37%

Criteria for Success or Failure

	Criteria for success of simulation	Criteria Met	Notes
1	Pressures above Minimum Operating Pressures (MinOP)?	Yes	9 exceptions in San Joaquin Valley and 1 additional exception, all returned from violations during simulation
2	Demand was met and regulators operated within rated capacities?	Yes	Supply 5,061 Bcf exceeded Demand 4,821 Bcf
3	Pressures below Maximum Operating Pressures (MOP)?	Yes	Four nodes exceeded max pressures by minor amounts; one did not return from minor violation
4	Linepack recovered?	Yes	Time 6: 2,637, Time 30: 2,636
5	Storage fields maintain pressure?	Yes	Pressures at time 30 are within 1% of pressures at time 6

Conclusions

The sensitivities on Simulation 05 resulted in the following Aliso Canyon withdrawal rates and inventory levels.

Sensitivity	Non-Aliso Inventory	Aliso Canyon Maximum Withdrawal Rate (MMcfd)	Aliso Canyon Inventory (Bcf)
1	70%	830	13
2	50%	1,010	20
3	37%	1,160	27

1) The base case showed that Aliso withdrawals were required even with the Non-Aliso fields 90% full.
2) At lower non-Aliso inventories, greater Aliso withdrawals would be needed, as determined by the sensitivities.
3) The simulations based on a 1-in-10 winter cold day showed that an Aliso inventory of 27 Bcf would be needed given actual recent inventories.
4) The above sensitivities analyzed a one-time cold day. To determine the recommended Aliso inventory level, the Feasibility Study presented next analyzes multiple cold days.

Questions?